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السلام علیکم ورحمۃ اللہ وبرکاتہ:

معزز ممبران: آپ کا وٹس ایپ گروپ ایڈمن "**اردو بکس**" آپ سے مخاطب ہے۔

آپ تمام ممبران سے گزارش ہے کہ:

- گروپ میں صرف PDF کتب پوسٹ کی جاتی ہیں لہذا کتب کے متعلق اپنے کمنٹس / ریویوز ضرور دیں۔ گروپ میں بغیر ایڈمن کی اجازت کے کسی بھی قسم کی (اسلامی و غیر اسلامی، اخلاقی، تحریری) پوسٹ کرنا سختی سے منع ہے۔
- گروپ میں معزز، پڑھے لکھے، سلجھے ہوئے ممبرز موجود ہیں اخلاقیات کی پابندی کریں اور گروپ رولز کو فالو کریں بصورت دیگر معزز ممبرز کی بہتری کی خاطر ریموو کر دیا جائے گا۔
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گروپ میں کسی بھی قادیانی، مرزائی، احمدی، گستاخِ رسول، گستاخِ امہات المؤمنین، گستاخِ صحابہ و خلفائے راشدین حضرت ابو بکر صدیق، حضرت عمر فاروق، حضرت عثمان غنی، حضرت علی المرتضیٰ، حضرت حسنین کریمین رضوان اللہ تعالیٰ اجمعین، گستاخ اہلبیت یا ایسے غیر مسلم جو اسلام اور پاکستان کے خلاف پراپیگنڈا میں مصروف ہیں یا ان کے روحانی و ذہنی سپورٹرز کے لئے کوئی گنجائش نہیں ہے لہذا ایسے اشخاص بالکل بھی گروپ جوائن کرنے کی زحمت نہ کریں۔ معلوم ہونے پر فوراً ریموو کر دیا جائے گا۔

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نوٹ: ہمارے کسی گروپ کی کوئی فیس نہیں ہے۔ سب فی سبیل اللہ ہے

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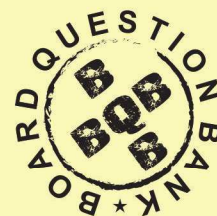
Smart Syllabus (ALP) Class 9 PHYSICS

(Note: All questions given in "Mini Exercises and Quick Quizs" are excluded.)

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1. To measure the Volume of a Solid Cylinder by measuring Length and Diameter of a Solid Cylinder with Vernier Callipers.
2. To find the Value of "g" by Free Fall Method.
3. Investigate the Relationship between Force of Limiting Friction and Normal Reaction to find the Co-efficient of Sliding Friction between a Wooden Block and Horizontal Surface.
4. To determine the Resultant of two forces graphically using a Horizontal Force Table.
5. To find the Weight of an unknown object by using Principle of Moments.
6. To study the Effect of the Length of Simple Pendulum on Time and hence find "g" by calculation.
7. To study the Relationship between Load and Extension (Helical Spring) by drawing a graph.
8. To find the Specific Heat by the method of mixture using Polystyrene Cups (used as container of negligible Heat Capacity).
9. To measure the Specific Heat of Fusion of Ice.

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- **International System of Units** - (Textbook pg.5)
  - Base Units - (Textbook pg.5,6)
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EXERCISE:

CLASS WORK:
- MCQs:1.1 (iv, v, vii, x) - (pg.24)
- Questions (1.4-1.7, 1.13) - (pg.25)
- Problems: (1.2, 1.6, 1.8) (Pg.25, 26)

HOME WORK:
- MCQs:1.1 (i-iii) - (pg.24)
- Questions (1.2,1.3,1.8,1.12)-(pg.24,25)
- Problems: (1.4, 1.5, 1.9) - (pg.25-26)

Part-I (EXERCISE - MCQs, Short Questions, Questions-LQs, Problems, Examples)

EXERCISE: MCQs

CLASS WORK: ■ MCQs: 1.1 (iv, v, vii, x) - (pg.24)
HOME WORK: ■ MCQs (i-iii) - (pg.24)

i. The number of basic units in SI is: [2017:MLT-I,RWP-I/II,DGK-I] [2018:RWP-I,SGD-I/II,SWL-I, MLT-I] [2019:RWP-I,SGD-I]

(A) 3 (B) 5 (C) 7 (D) 9

ii. Which of the following unit is not a derived unit? [2013:BHP-II][2014:SGD-I] [2016:RWP-II,BHP-II] [2017:SWL-I/II] [2018:RWP-II]

(A) watt (B) newton (C) pascal (D) kilogram

iii. Amount of a substance in terms of numbers is measured in: [2013:DGK-I][2014:SGD-II][2015:FSD-I,GRW-I] [2016:LHR-I,MLT-I][2017:FSD-I] [2017:RWP-I,LHR-II, DGK-II]

(A) gram (B) kilogram (C) newton (D) mole

iv. An interval of 200 μs is equivalent to: [2015:GRW-I][2016LHR-II,FSD-I,MLT-I,DGK-I,SHL-II] [2018:BHP-I/II][2019:GRW-II]

(A) 0.2s (B) 0.02s (C) 2×10^{-4}s (D) 2×10^{-6}s

v. Which one of the following is the smallest quantity? [2013:GRW-II][2014:LHR-II][2015:MLT-I] [2016:BHP-II,AJK-I] [2017:GRW-I,MLT-II] [2018:GRW-I/II][2019:MLT-I,GRW-I,SWL-II]

(A) 0.01 g (B) 2 mg (C) 100 μg (D) 5000 ng

vii. A student claimed the diameter of a wire as 1.032 cm using a Vernier Callipers. Upto what extent do you agree with it?

(A) 1 cm (B) 1.0 cm (C) 1.03 cm (D) 1.032 cm

(x) Significant figures in an expression are:

(A) all the digits (B) all the accurately known digits
(C) all the accurately known digits and the first doubtful digit
(D) all the accurately known and all the doubtful digits

ANSWERS MCQs, CH#1: *Physical Quantities & Measurement (Exercise)*

i.	(C)	ii.	(D)	iii.	(D)	iv.	(C)	v.	(D)	vii.	(C)	x.	(C)

Exercise Review Questions

CLASS WORK:	■	Review Questions (1.4-1.7, 1.13) - (pg.25)
HOME WORK:	■	Review Questions (1.2, 1.3, 1.8, 1.12) - (pg.24,25)

1.2 What is the difference between base quantities and derived quantities? Give three examples of each. [2016:LHR-II,BHP-I,II] [2017:BHP-II] [2018:SGDII,SWLII,FSD-I/II]

Ans. Base Quantities: "Base quantities are the physical quantities on the basis of which other quantities are expressed."

Examples: There are seven base quantities which form the foundation for all other physical quantities. These are:

Length, mass, time, electric current, temperature, intensity of light and the amount of a substance (in mole).

Derived Quantities: "The physical quantities that are expressed in terms of base quantities are called derived quantities."

Examples: Derived quantities include area, volume, speed, force, work, energy, power, electric charge, electric potential, etc.

1.3 Pick out the base units in the following:
Joule, Newton, kilogram, hertz, mole, ampere, metre, Kelvin, coulomb.

Ans. Base Units: kilogram, mole, ampere, metre, Kelvin

1.4 Find base quantities involved in each of the following derived quantities?
(a) speed (b) volume (c) force (d) work

Ans. Base Quantities Involved in:

(a) Speed: Mathematically, $\text{Speed} = \frac{\text{distance}}{\text{time}}$

Thus, the base quantities involved in speed are distance and time.

(b) Volume: By definition; Volume $= \text{Area} \times \text{Height} = \text{length} \times \text{width} \times \text{height}$

So, the base quantity involved in volume is length.

(c) Force:

We know that; Force = ma

Expressing in SI units;

$$\text{Force} = \text{kg}\,(\text{ms}^{-2})$$

Thus, the base quantities involved in force are mass, length and time.

(d) Work: By definition; $W = F \times S$

Expressing in SI units;

$$W = \text{kg}\,(\text{ms}^{-2}) \times \text{m} = \text{kgms}^{-1}$$

Thus, the base quantities involved in work are, mass, length and time.

1.5 Estimate your age in seconds. [2013:MLT-I][2014:LHR-I,DGK-I,GRW-II][2016:FSD-II] [2017:LHR-I,FSD-I] [2017:BHP-I]

Solution:

Suppose:

Age of M. Subhan Abbas (in years) = 14 years

We know that

Seconds in one year = 1 year × 24 hours × 60 minutes × 60 seconds
= 365 × 24 × 60 × 60 s
= 312536,000 s

Seconds in 14 years = 14 × 31536000 s
= 441504000 s
= 4.42×10^{8} seconds (Ans.)

1.6 What role SI units have played in the development of science? [2013:LHR-I][2016:LHR-I]

Ans. **Role of SI units in the Development of Science:** With the developments in the field of science and technology, the need for a commonly acceptable system of units was seriously felt all over the world particularly to exchange scientific and technical information. This need was fulfilled by SI units.

1.7 What is meant by a Vernier Calliper? [2013:MLT-I,SHL-II][2014:LHR-II,FSD-II][2015:LHR-II] [2016:FSD-II]

Ans. Vernier Calliper: "An instrument used to measure small lengths such as internal or external diameter of a cylinder, etc. is called a vernier calliper."

1.8 What do you understand by the zero error of a measuring instrument?

[2014:LHR-II][2015:SHL-II] [2016:SHL-II]

Ans. Zero Error: "Any error in the measuring instrument is called its zero error."

1.12 What is meant by significant figures of a measurement?

Ans. Measurements in physics such as speed (velocity), acceleration, etc. are very important. Such measurements are more accurate and precise if time intervals are extremely very short. They give correct idea about anything.

1.13 How is precision related to the significant figures in a measured quantity?

Ans. More significant figures means greater precision i.e. 2.6 cm is more accurate as compared to 2.06cm.

EXERCISE PROBLEMS

CLASS WORK:	■	Problems (1.2, 1.6, 1.8) - (pg.25-26)
HOME WORK:	■	Problems (1.4, 1.5, 1.9) - (pg.25-26)

1.2 How do the prefixes micro, nano and pico are related to each other?

Solution:

- **Rleation between Micro and Nano:**

1 micro = 10^{-6}

Multiplying and dividing by 1000, we get

1 micro = $10^{-6} = \frac{1000}{1000} \times 10^{-6} = 10^3 \times 10^{-3} \times 10^{-6} = 10^3 \times 10^{-9}$

$= 10^3 \times$ nano [$\because$ nano = 10^{-9}]

Thus,

1 micro = 1000 nano (Ans.)

- **Rleation between Micro and Pico:**

1 micro = 1000×10^9

1 micro = $10^3 \times 10^9$

1 micro = 10^{12} pico (Ans.)

- **Rleation between Nano and Pico:**

We know that

1 nano = 10^{-9}

Multiplying and dividing by 10^3, we get

$= \frac{1000}{1000} \times 10^{-9}$

$= 1000 \times 10^{-12}$

1 nano = $10^3 \times$ pico [$\because$ pico = 10^{-12}]

Thus,

1 nano = 1000 pico (Ans.)

or 1 nano = 10^3 pico (Ans.)

1.4 Rewrite the following in standard form. [2013:GRW-II,BHP-II][2014:GRW-I] [2015:DGK-II]

(a) 1160×10^{-27} (b) 32×10^5 (c) 725×10^{-5}kg (d) 0.02×10^{-8}

Solution:

(a) $1160 \times 10^{-27} = 1.160 \times 10^3 \times 10^{-27} = 1.160 \times 10^{-24}$

(b) $32 \times 10^5 = 3.2 \times 10 \times 10^5 = 3.2 \times 10^6$

(c) 725×10^{-5} kg $= 7.25 \times 10^2 \times 10^{-5}$ kg $= 7.25 \times 10^{-3}$ kg

$= 7.25 \times 10^{-3} \times 10^3$g = 7.25 g [$\because$ k = 10^3]

(d) $0.02 \times 10^{-8} = 2.0 \times 10^{-2} \times 10^{-8} = 2.0 \times 10^{-10} = 2.0 \times 10^{-10}$

1.5 Write the following quantities in standard form. [2013:RWP-I] [2015:FSD-I][2014:RWP-II,SHL-I]

(a) 6400km (b) 380000km (c) 3,00,000,000ms^{-1} (d) Seconds in a day

Solution:

(a) 6400 km $= 6.4 \times 10^3$km $= 6.4 \times 10^3 \times 10^3$m $= 6.4 \times 10^6$ m = 6.4 Mm [$\because$ M = 10^6]

(b) 380000 km = 3.8×10^5 km

(c) 3,00,000,000 $ms^{-1} = 3 \times 10^8$ ms^{-1}

(d) Seconds in a day

Seconds in a day=$24 \times 60 \times 60$s = 86400s $= 8.64 \times 10^4$ s

1.6 On closing the jaws of a Vernier Callipers, zero of the vernier scale is on the right to its main scale such that 4th division of its vernier scale coincides with one of the main scale division. Find its zero error and zero correction.

Solution:

Given Data:

Main scale reading = 0.0 cm

No. of vernier scale divs. coinciding with main scale = 4 div.

Vernier scale reading = No. of vernier scale divs coinciding with M.S. $\times$ L.C.

= 4×0.1 cm = 0.04 cm

To Find:

Zero error = ?

Zero error correction = ?

Formula:

Zero error= Main scale reading + Vernier scale reading

Calculations:

Putting values we get;

Zero Error = 0.0 cm + 0.04 cm = 0.04cm (Ans.)

Zero correction= – 0.04cm (Ans.)

1.8 Which of the following quantities have three significant figures?

(a) 3.0066 m (b) 0.00309 kg (c) 5.05×10^{-27} kg (d) 301.0 s

Solution:

(a) 3.0066 m :

No. of significant figures = 5 (i.e. 3, 0, 0, 6, 6)

All the five digits are significant. Because the zeros between two significant digits are also significant.

(b) 0.00309 kg :

No. of significant figures = 3 (i.e. 3, 0 9)

First two zeros are not significant. They are used to space the decimal point. Thus, the digits 3, 0, and 9 are significant. Thus it has three significant figures.

(c) 5.05×10^{-27} kg :

No. of significant figures = 3 (i.e. 5, 0, 5)

All the three digits are significant.

(d) 301.0 s :

No. of significant figures = 3 (i.e. 3, 0, 1)

All the three digits are significant.

1.9 What are the significant figures in the following measurements?

Solution:

(a) 1.009 m :

No. of significant figures = 4 (i.e. 1, 0, 0 9)

All the four digits are significant. Because the zeros between two significant figures are also significant.

(b) 0.00450 kg:

No. of significant figures = 3 (i.e. 4 , 5, 0)

The first two zeros are not significant. Thus, in this case, significant figures are 3. The first two zeros before decimal point are used only for spacing.

(c) 1.66×10^{-27} kg:

No. of significant figures = 3 (i.e. 1, 6, 6)

All the three digits are significant. Thus, in this case, no. of significant figures are three.

(d) 2001 seconds:

No. of significant figures = 4 (i.e. 2, 0, 0, 1)

All the four digits are significant. Because, zeros between two significant figures are also significant. Thus, the no. of significant figures in this case are 4.

Examples

■ Example 1.4 (pg.22)

EXAMPLE 1.4: Express the following values in scientific notations. [2016:SWL-I]

(i) 100.8 S **(ii)** 0.00580 km **(iii)** 210.0 g

Solution:

(a) All the four digits are significant. The zeros between the two significant figures 1 and 8 are significant. To write the quantity in scientific notation, we move the decimal point two places to the left, thus: $100.8s = 1.008 \times 10^2 s$

(b) The first two zeros are not significant. They are used to space the decimal point. The digit 5, 8 and the final zero are significant. Thus there are three significant figures. In scientific notation, it can be written as 5.80×10^{-3} km.

(c) The final zero is significant since it comes after the decimal point. The zero between last zero and 1 is also significant because it comes between the significant figures. Thus the number of significant figures in this case is four. in scientific notation, it can be written as; $210.0g = 2.100 \times 10^2 g$

Part-II (ALP Topical – MCQs, Short Questions, Long Questions)

UP-To-Date Papers: MCQs

(According to ALP-Content List for Exam-2021)

■ **Physical Quantities** - (Pg.4)

(Physical Quantites, Base Quantities – (Pg.5)**, Derived Quantities)** - (pg.5)

1. The base quantity is: [2013:LHR-I] [2017:FSD-II]
(A) mass (B) volume (C) torques (D) momentum

2. Identify the base quantity: [2016:GWR-I,FSD-II]
(A) speed (B) area (C) force (D) distance

■ **International System of Units (Base units and Derived units)** - (pg.5,6)

3. Kilogram is a: [2016:GWR-II]
(A) base unit (B) base quantity (C) derived unit (D) derived quantity

4. In SI, the unit of mass is: [2019:MLT-II]
(A) second (B) meter (C) kilogram (D) newton

5. The unit of density in System International is: [2017:MLT-I] [2017:LHR-I,MLT-II] [2019:RWP-I,GRW-II]
(A) kg m (B) kgm^{-1} (C) kgm^{-2} (D) kgm^{-3}

■ **Prefixes** - (pg.7,8)

6. One micro meter is equal to: [2013:AJK-I],[2014:FSD-II]
(A) 10^{-6} m (B) 10^{-3} m (C) 10^{-9} m (D) 10^3 m

7. One milliliter is equal to: [2014:MLT-I]
(A) 1 mm^3 (B) 1 cm^3 (C) 1 dm^3 (D) 1 m^3

8. One tera is equal to: [2017:LHR-II]
(A) 10^{-12} (B) 10^{-18} (C) 10^{12} (D) 10^{18}

9. One Femto is equal to: [2017:MLT-I] [2018:SWL-II]
(A) 10^{-12} (B) 10^{12} (C) 10^{-15} (D) 10^{15}

10. One meter is equal to: [2017:RWP-II]
(A) 10 cmop (B) 100 cm (C) 10000 cm (D) 100 mm

11. One megameter is equal to: [2013:GRW-I][2017:LHR-I]
(A) 10^6 m (B) 10^9 m (C) 10^{-6} m (D) 10^{12} m

12. One giga gram is equal to: [2013:BHP-I][2017:SWL-I]
(A) 10^9 g (B) 10^6 g (C) 10^3 g (D) 10^{-6} g

13. One pico metre is equal to: [2017:DGK-II]
(A) 10^{12} m (B) 10^{-12} m (C) 10^6 m (D) 10^{-6} m

14. One cubic meter is equal to: [2013:RWP-I,BHP-II],[2014:GRW-I,MLT-I]
(A) 100 litres (B) 1000 litres (C) 10 litres (D) 10^6 litres

15. One litre is equal to_____ milliliter. [2016:FSD-II]
(A) 10^2 (B) 10^3 (C) 10^4 (D) 10^5

16. One litre is equal ot: [2017:LHR-I][2019:LHR-II,FSD-II]
(A) 1 mm (B) 1 cm^3 (C) 1 dm^3 (D) 1 m^3

17. 2 MW = ?
(A) 2×10^2 W (B) 2×10^6 W (C) 2×10^6 W (D) 2×10^8 W

18. 5 ns = ?
(A) 5×10^9 s (B) 5×10^{-9} s (C) 5×10^6 s (D) 5×10^{-6} s

■ **Scientific Notation** - (pg.8)

19. 6400000 m = ?
(A) 6.4×10^4 m (B) 6.4×10^5 m (C) 6.4×10^6 m (D) 6.4×10^9 m

20. 3000000000 ms^{-1} = ?
(A) 3.0×10^9 ms^{-1} (B) 3.0×10^7 ms^{-1} (C) 3.0×10^{12} ms^{-1} (D)3.0×10^{12} ms^{-1}

■ **Measuring Instruments** - (Textbok pg.10)

■ **Vernier Callipers (only) -** (pg.10,11)

21. The least count of a vernier callipers is: [2013:DGK-II] [2016:SGD-I] [2017:BHP-II] [2018:DGK-I] [2019:SGD-II,DGK-II]
(A) 0.01 mm (B) 0.1 mm (C) 1 mm (D) 1 cm

22. The least count of a digital vernier callipers is: [2014:RWP-I [2019:LHR-I]
(A) 0.01 mm (B) 0.001 mm (C) 0.1 mm (D) 1 mm

■ **Significant Figures** - (pg.20-22)

23. The number of significant figures in 0.00580 is: [2013:FSD-I,MLT-II][2014:RWP-II][2016:SGD-I][2017:BHP-I]
(A) 6 (B) 5 (C) 3 (D) 2

24. 0.027 has significant digits: [2013:RWP-I]
(A) 2 (B) 1 (C) 3 (D) 4

ANSWERS MCQs, CH#1: ***Physical Quantities & Measurement (ALP Topical MCQs)***

1.	(A)	**2.**	(D)	**3.**	(A)	**4.**	(C)	**5.**	(D)	**6.**	(A)	**7.**	(B)
8.	(C)	**9.**	(C)	**10.**	(B)	**11.**	(A)	**12.**	(A)	**13.**	(B)	**14.**	(B)
15.	(B)	**16.**	(C)	**17.**	(C)	**18.**	(B)	**19.**	(C)	**20.**	(A)	**21.**	(B)
22.	(A)	**23.**	(C)	**24.**	(A)								

UP-TO-DATE PAPERS: Short Questions

(According to ALP-Content List for Exam-201)

■ **Physical Quantities**- (Textbook pg.4)

■ Base Quantities - (Textbook pg.5) ■ Derived Quantities - (Textbook pg.6)

1. What is meant by Physical Quantities? Give an example. [2017:MLT-I]

Ans. Physical Quantities: "All measurable quantities are called Physical Quantities."

2. What is meant by base quantities? Give their examples.
[2013:SGD-II,GRW-II,DGK-I,SHL-I][2014:DGK-I,MLT-I,SHL-I][2015:FSD-II,RWP-I,II,GRW-II][2017:GRW-I,RWP-I][2018:RWP-I,LHR-II] [2017:FSD-I/II] [2019:SWL-I] [2019:LHR-II]

Ans. Base Quantities: "Base quantities are the physical quantities on the basis of which other quantities are expressed."

Examples: There are seven base quantities which form the foundation for all other physical quantities. These are:

Length, mass, time, electric current, temperature, intensity of light and the amount of a substance (in mole).

3. What is meant by derived quantities? Give their examples. [2016:AJK-II][2017:GRW-II,SWL-II]
[2013:LHR-II,RWP-II,GRW-II,SGD-II,SHL-I,II][2014:MLT-I,SGD-II,SHL-II,DGK-I][2015:FSD-II] [2018:SWL-I,GRW-II] [2016:GRW-II][2019:MLT-I]

Ans. Derived Quantities: "The physical quantities that are expressed in terms of base quantities are called derived quantities."

Examples: Derived quantities include area, volume, speed, force, work, energy, power, electric charge, electric potential, etc.

■ **International System of Units**- (Textbook pg.5)

4. What is meant by unit? Also write the examples. [2017:MLT-I]

Ans. Unit: "The standard quantity which is used to measure / compare unknown quantities is known as a unit."

Examples: The unit of mass is kilogram. All masses are expressed in terms of kilogram, like 1 kilogram, 2 kilogram, 1000 kilograms (1 ton), etc.

Similarly the unit of length is metre. All distances are measured in terms of meter, like 1 meter, 2 metres, 1000 metres (1 kilometre), etc.

5. What is meant by base units? Give two examples. [2013: GRW-I] [2017:SWL-I][2019:LHR-I] [2016:DGK-II] [2018:SWL-I]

Ans. Base Units: "The units that describe base quantities are called base units." e.g metre(m), second (s)."

Seven Base Quantities in System International:

Quantity	Symbol	Unit	
Length	L	Metre	m
Mass	M	Kilogram	kg
Time	S	Second	s
Electric Current	I	Ampere	A
Intensity of Light	L	Candela	cd
Temperature	T	Kelvin	K
Amount of Substance	N	Mole	mol

6. Define derived units. Enlist some derived units. 2016:SGD-I]

Ans. Derived Units: "The units used to measure derived quantities are called derived units."

Table 1.2: Derived Quantities:

Name	Symbol	Name	Symbol
Speed	V	Metre per second	ms^{-1}
Acceleration	A	Metre per second per second	ms^{-2}
Volume	V	cubic metre	m^3
Force	F	Newton	N or ($kgms^{-2}$)
Pressure	P	Pascal	Pa or (Nm^{-2})
Density	ρ	kilogram per cubic metre	kgm^{-3}
Charge	Q	Coulomb	C or (As)
Momentum	P	Newton-second	Ns

■ **Prefixes** - (Textbook pg.7)

7. Define prefixes and write two examples. [2016:LHR-II,GRW-II][2019:LHR-II,FSD-II,SWL-II] [2013:FSD-II,DGK-II,AJK-II][2014:SHL-II] [2017:GRW-II,FSD-II] [2018:GRW-I,LHR-II,DGK-II-SGD,II]

Ans. Prefixes: "Prefixes are letters or words used before SI units as addition."

Prefixes are used to express very large and small quantities.

Examples: (i) micro (μ): 10^{-6} (ii) nano (μ): 10^{-9},

8. Express the following quantities using prefixes 5000g, 52 x 10^{-10} Kg. [2018:SWL-I-MLT-I]

(a) 5000 g (b) 52×10^{-10} kg

Solution:

(a) 5000 g $= 5\times1000$ g

$= 5\times10^3$g = **5 kg** [$\because$ k = 10^3]

(b) 52×10^{-10} kg

$= 5.2\times10^{-9}$kg

$= 5.2\times10^{-9}\times10^3$ g

$= 5.2\times10^{-6}$g = **5.2μg** [$\because$ μ = 10^{-6}]

1.5 Scientific Notation - (Textbook pg.8)

9. What is meant by Scientific Notation? What is its rule? Explain with examples. [2013:BHP-I,DGK-I,AJK-II][2015:SGD-I] [2016:RWP-II,FSD-,DGK-I,BHP-II,SWL-II] [2018:RWP-I,LHR-I,GRW-II] [2019:LHR-I,RWP-I,MLT-I]

Ans. Scientific Notation: "A scientific way to write large or small quantities in some powers of ten is called standard from or scientific notation."

Rules of Writing a Number in Scientific Notation: In scientific notation, a number is expressed as some power of ten multiplied by a number between 1 and 10.

Examples:

(i) The number 62750 can be written as 62.75×10^3 or 6.275×10^4 or 0.62×10^5. But the number that has one non-zero digit before the decimal i.e. 6.275×10^4 is preferably be taken as standard form.

(ii) Similarly, the standard form of 0.00045 s is 4.5×10^{-4} s.

(iii) The Moon is 384000000 metres away from the Earth. In standard form, it can be expressed as 3.84×10^8 m.

10. Write in standard form 3,84,000,000 m and 0.00045 s. [2017:GRW-I] [2018:DGK-II]

Ans. **Standard Form:** 3,84,000,000 m = 3.84×10^8 m

Standard Form: 0.00045 s = 4.5×10^{-4} s

11. Express in scientific notation: 0.00580 km, 210 g. [2014:FSD-I] [2017:RWP-I]

Ans. Solution:

(i) Significant figures in 0.00580 are 3.

0.00580 km = 5.80×10^{-3} km

(ii) 210 g = 2.1×10^2 g

■ **Vernier Callipers (only) -** (Textbook pg.10)

12. What is a vernier calliper?

Ans. Vernier Calliper: Vernier Callipers is an instrument which gives accuracy greater than 1 mm in measuring very small lengths.

13. Descreibe the two scales of a Vernier Calliper.

Ans. A vernier calliper consists of two jaws having two scales. One is a fixed jaw with main scale attached to it. Main scale has centimetre and milimetre marks on it. The other jaw is a moveable jaw. It has vernier scale having 10 divisions over it such that each of its division is 0.1 mm.

14. How many divisions are there on a Vernier scale? [2016:LHR-I]

Ans. There are 10 (ten) divisions on a vernier scale such that each of its division is 0.1 mm.

15. What is meant by vernier constant? [2016:SGD-I] [2018:MLT-II,SWL-II]

Ans. The minimum reading which can be taken by a vernier calliper correctly is called vernier constant. Its value is 0.1 mm or 0.01 cm.

16. What is least count of a vernier callipers? How it is measured? [2019:FSD-I,DGK-I] [2019:GRW-II,SWL-II]

Ans. Least Count/Vernier Constant: "The minimum reading which can be taken by a Vernier calliper correctly is called vernier constant or least count."

Formula to Calculate Least Count: Least count of the Vernier Callipers can also be found as given below:

$$\text{Least Count of Venier Callipers} = \frac{\text{small reading on Main scale}}{\text{no. of divisions on Venier scale}}$$

17. What do you understand by the zero error of a measuring instrument?
[2014: LHR-II][2015:SHL-II] [2016:SHL-II][2017:SWL-II] [2018:FSD-II]

Ans. Zero Error: "Any error in the measuring instrument is called its zero error."

18. Why is the use of zero error necessary in a measuring instrument?
[2014:LHR-II][2015:SWL-II] [2016:SWL-II][2017:SWL-II][2018:FSD-II]

Ans. By using zero error we get reliable and accurate meaurement.

19. Define zero error and zero correction. [2014: GRW-I][2017:BHP-I][2019:MLT-I/II,DGK-I]

Ans. Zero Error: "Any error in the measuring instrument is called its zero error."

Zero Correction: Knowing the zero error, correction can be made to find the correct measurement. Such a correction is called zero correction of the instrument.

20. Differentiate between positive zero error and negative zero Error. [2016:BHP-II]

Ans. Positive Zero Error: Zero error will be positive if zero line of a vernier scale is on the right side of the zero of a main scale.

Negative Zeror Error: Zero error will be negative if zero line of a vernier scale is on the left side of zero of the main scale.

21. What is the value of least count of a digital Vernier calliper?

Ans. Least Count of Digital Vernier Calliper: The least count of a digital vernier callipers is 0.01mm or 0.001 cm.

1.7 Significant Figures - (Textbook pg.20-23)

22. Define significant figures?

Ans. Significant Figures: "All the accurately known digits and the first doubtful digit in an expression are called significant figures."

Example: Suppose a student measures the length of a book as 18 cm using a measuring tape. The numbers of significant figures in his/her measured value are two. The left digit 1 is the accurately known digit, while the digit 8 is the doubtful digit for which the student may not be sure.

LONG Questions from UP-TO-DATE PAPERS

(According to ALP-Content List for Exam-201)

Q.1: List the seven units of System International along with their symbols and physical quantities? [2013:GRW-I,AJK-I][2014:FSD-II,GRW-I][2015:RWP-I,DGK-I]

Ans. System International of units consists of seven base quantities. These quantities, their system internal units withy symbols are given in the following table.

Table 1.1:
Base quantities, their System International units with Symbols

Quantity		Unit	
Name	**Symbol**	**Name**	**Symbol**
Length	l	Metre	M
Mass	m	Kilogram	Kg
Time	t	Second	S
Electric current	I	Ampere	A
Intensity of light	L	Candela	Cd
Temperature	T	Kelvin	K
Amount of a substance	n	Mole	Mol

Q.2: What are derived units? How are they obtained from base units? Explain with examples. [2013:MLT-II][2014:FSD-II][2015:DGK-I,II]

Ans. Derived Units: "The units used to measure derived quantities are called derived units."

Examples:

(i) Unit of Speed (ii) Unit Acceleration

Derivation of Derived Units: These units are obtained by multiplying or dividing one or more base units with each other.

(i) Unit of Speed:

Speed is a derived quantity. Its SI unit is called derived unit. Speed is defined as rate of change of distance.

Mathematically, $\text{Speed} = \dfrac{\text{Distance}}{\text{Time}}$

Since SI unit of distance is metre (m) and that of time is second (s). Thus, the SI unit of speed is ms^{-1}.

Mathematically,

$$\text{Unit of speed} = \; = \frac{m}{s} = ms^{-1}$$

(ii) Unit of Acceleration: Acceleration is a derived quantity. Its SI unit is called derived unit. Acceleration is defined as the rate of change of velocity of a body.

$$\text{Acceleration} = \frac{\text{Velocity}}{\text{Time}}$$

Since SI unit of velocity is metre per second (ms^{-1}) and that of time is second (s). Thus, the SI unit of acceleration is ms^{-2}.

Mathematically,

$$\text{Unit of Acceleration} = \frac{\text{Unit of velocity}}{\text{Unit of time}} = \frac{ms^{-1}}{s} = ms^{-2}$$

Table 1.2: Derived Quantities

Name	**Symbol**	**Name**	**Symbol**
Speed	V	Metre per second	ms^{-1}
Acceleration	A	Metre per second per second	ms^{-2}
Volume	V	cubic metre	m^3
Force	F	Newton	N or ($kgms^{-2}$)
Pressure	P	Pascal	Pa or (Nm^{-2})
Density	ρ	kilogram per cubic metre	kgm^{-3}
Charge	Q	Coulomb	C or (As)
Momentum	P	Newton-second	Ns

Q.3: What are prefixes? Give some examples of measurements in which prefixes are used to express them. [2013:FSD-II,BHP-I,AJK-II][2014:SHL-II][2015:DGK-II]

Ans. Prefixes: "Prefixes are letters or words used before SI units as addition."

Rules to Use Prefixes:

(i) Prefixes are used to express very large and small quantities.

(ii) Any quantity cannot contain two prefixes at a time.

Importance Prefixes:

Prefix	Symbol	Multipliser	Prefix	Symbol	Multipliser
exa	E	10^{18}	deci	d	10^{-1}
peta	P	10^{15}	centi	C	10^{-2}
tera	T	10^{12}	milli	m	10^{-3}
giga	G	10^{9}	micro	μ	10^{-6}
mega	M	10^{6}	nano	n	10^{-9}
kilo	K	10^{3}	pico	p	10^{-12}
hetco	H	10^{2}	femto	f	10^{-15}
decta	H	10^{1}	atto	a	10^{-18}

Explanation through Examples:

(i) $20,000\ g = 20 \times 10^3\ g = 20\ kg$ $(\because k = 1000 \text{ or } 10^3)$

(ii) $200,000\ ms^{-1} = 200 \times 10^3\ ms^{-1}$ $(\because k = 1000 \text{ or } 10^3)$

$= 200\ kms^{-1}$

(iii) $4,800,000\ W = 4800 \times 10^3\ W$

$= 4800\ kW$ $(\because k = 10^3)$

$= 4.8 \times 10^3\ W$

$= 4.8 \times 10^6\ W$

$= 4.8$ MW (Mega) $(\because \text{mega(M)} = 10^6)$

(iv) $3,300,000,000Hz = 3300 \times 10^6\ Hz$

$= 3.3 \times 10^3 \times 10^6\ Hz$

$= 3.3\ GHz$ $(\because \text{giga (G)} = 10^9)$

(v) $0.00002\ g = 0.02\ mg = 0.02 \times 10^{-3}\ g$ $(\because \text{milli (m)} = 10^{-3})$

$= 20 \times 10^{-6}\ g$

$= 20\ \mu g$ $(\because \text{micro } (\mu) = 10^{-6})$

(vi) $0.000\ 000\ 0081m = 0.0081 \times 10^{-6}m$

$= 8.1 \times 10^{-9}m = 8.1\ nm$ $(\because \text{nano (n)} = 10^{-9})$

Q.6: Write the rules to find the significant digits in a measurement. [2013:BHP-I] [2017:BHP-II]

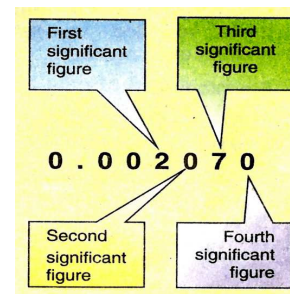
Ans. Rules to Find the Significant Digits in a Measurement: [2014:SGD-I][2015:RWP-II]

(1) Digits other than zero are always significant.
e.g. 27 has 2 significant digits, 2 and 7.
275 has 3 significant digits.

(2) Zeros between two significant figures are also significant.
e.g. 2705 has 4 significant figures.

(3) Final zero or ending zeros after decimal point are significant.
e.g. 275.00 has 5 significant figures.

(4) Zeros used for spacing the decimal point are not significant. Here zeros are placeholders only. That is zero after decimal point is not significant.
e.g. 0.027 has 2 significant figures.

(5) In whole numbers that end in one or more zeros without a decimal point. These zeros may or may not be significant. In such cases, it is not clear which zero serve to locate the position value and which are actually parts of the measurement. In such a case, express the quantity using scientific notation to find the significant zero.
Consider the length of a tower as 1220 m. Its scientific notation is $1.220 \times 10^3 m$. This measurement has four significant digits.

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Roll No.: ______________________

Test # 1 | **Creative UNIT-WISE Self Test** | **Unit # 1**

Physics-9

1st/2nd Group

Paper-I *(Objective Type)*

Time: 15 minutes

Total Number: 12

CREATIVE COMPUTERIZED ANSWER SHEET

	A B C D		A B C D		A B C D		A B C D		A B C D		A B C D
1.	Ⓐ Ⓑ Ⓒ Ⓓ	2.	Ⓐ Ⓑ Ⓒ Ⓓ	3	Ⓐ Ⓑ Ⓒ Ⓓ	4.	Ⓐ Ⓑ Ⓒ Ⓓ	5.	Ⓐ Ⓑ Ⓒ Ⓓ	6.	Ⓐ Ⓑ Ⓒ Ⓓ
7.	Ⓐ Ⓑ Ⓒ Ⓓ	8.	Ⓐ Ⓑ Ⓒ Ⓓ	9.	Ⓐ Ⓑ Ⓒ Ⓓ	10.	Ⓐ Ⓑ Ⓒ Ⓓ	11.	Ⓐ Ⓑ Ⓒ Ⓓ	12.	Ⓐ Ⓑ Ⓒ Ⓓ

NOTE: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that CIRCLE in front of that question with MARKER OR PEN INK in the ANSWER-BOOK. CUTTING or FILLING TWO or MORE CIRCLES will result in zero mark in that question.

EXERCISE MCQs

1-1. The number of base units in SI is:
(A) 3 (B) 5 (C) 7 (D) 9

2. Which of the following unit is not a derived unit?
(A) watt (B) newton (C) pascal (D) kilogram

3. Amount of a substance in terms of numbers is measured in:
(A) gram (B) kilogram (C) newton (D) mole

4. An interval of 200 μs is equivalent to:
(A) 0.2s (B) 0.02s (C) 2×10^{-4}s (D) 2×10^{-6}s

5. Which one of the following is the smallest quantity?
(A) 0.01 g (B) 2 mg (C) 100 μg (D) 5000 ng

6. A student claimed the diameter of a wire as 1.032 cm using a Vernier Callipers. Upto what extent do you agree with it?
(A) 1 cm (B) 1.0 cm (C) 1.03 cm (D) 1.032 cm

7. Significant figures in an expression are:
(A) all the digits (B) all the accurately known digits
(C) all the accurately known digits and the first doubtful digit
(D) all the accurately known and all the doubtful digits

Up-to-Date MCQs

8. The unit of density in System International is:
(A) kg m (B) kgm^{-1} (C) kgm^{-2} (D) kgm^{-3}

9. One cubic meter is equal to:
(A) 100 litres (B) 1000 litres (C) 10 litres (D) 10^6 litres

10. $3000000000\ ms^{-1}$ = ?
(A) $3.0 \times 10^9\ ms^{-1}$ (B) $3.0 \times 10^7\ ms^{-1}$ (C) $3.0 \times 10^{12}\ ms^{-1}$ (D) $3.0\times10^{12}\ ms^{-1}$

11. The number of significant figures in 0.00580 is:
(A) 6 (B) 5 (C) 3 (D) 2

12. One litre is equal ot:
(A) 1 mm (B) $1\ cm^3$ (C) $1\ dm^3$ (D) $1\ m^3$

☆…………☆…………☆

Roll No.: ____________________

Physics-9

$1^{st}/2^{nd}$ Group

Paper-I *(Subjective Type)*

Time: 1.45 Hour

Total Number: 48

Part-I

2- Write Short Answers to any FIVE (5) questions. [5×2=10]

(i) What is meant by Physical Quantities? Give an example.
(ii) What are two main types of physical quantities?
(iii) What is meant by base quantities. Give two examples.
(iv) What is meant by derived quantities? Give two examples.
(v) What is meant by unit? Also write the examples.
(vi) What role SI units have played in the development of science?
(vii) What is meant by base units? Give examples.
(viii) What is meant by derived units? Give examples.

3- Write Short Answers to any FIVE (5) questions. [5×2=10]

(i) What is meant by prefixes? Give two examples.
(ii) What is meant by Scientific Notation? What are its rule? Explain with examples.
(iii) Write in standard form 3,84,000,000 m and 0.00045 s.
(iv) What do you understand by the zero error of a measuring instrument?
(v) What is the use of vernier calliper?
(vi) Why is the use of zero error necessary in a measuring instrument?
(vii) What is the value of least count of a digital Vernier calliper?
(viii) How many divisions are there on a Vernier scale?

4- Write Short Answers to any FIVE (5) questions. [5×2=10]

(i) Descreibe the two scales of a Vernier Calliper.
(ii) What is meant by vernier constant?
(iii) What is least count of a vernier callipers? How it is measured?
(iv) Define significant figures.
(v) How is precision related to the significant figures in a measured quantity?
(vi) Describe the multiples and sub-multiples of length?
(vii) Name five prefixes most commonly used.
(viii) What is meant by positive and negative zero error?

Part-II

Note: Attempt any TWO (2) Long Questions. [2×9=18]

5. (a) What is the difference between base quantities and derived quantities? Give three examples of each. [5]

(b) Find base quantities involved in each of the following derived quantities? [4]
(a) speed (b) volume (c) force (d) work

6. (a) Describe the method to take reading on Vernier Callipers.

(b) How do the prefixes micro, nano and pico are related to each other? [4]

7. (a) Write the rules to find the significant digits in a measurement. [5]

(b) Rewrite the following in standard form. [4]
(a) 1160×10^{-27} (b) 32×10^{5} (c) 725×10^{-5}kg (d) 0.02×10^{-8}

☆............☆............☆

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LEARNING & TESTING

ہی کیوں؟

کیونکہ کری ایٹو سمارٹ سلیبس لرننگ اینڈ ٹیسٹنگ سیریز کو موجودہ حالات کے مطابق پنجاب کریکولم ونگ کی جانب سے جاری کردہ تسریع التعلم پروگرام (Accelerated Learning Program-ALP) کے عین مطابق ترتیب دیا گیا ہے۔ ماضی میں نیا تعلیمی سیشن مارچ میں شروع ہوجاتا تھا اور موسم گرما کی تعطیلات کے بعد جب طلبہ سکول آتے تو اساتذہ کرام بچوں کی ٹیسٹنگ کے لیے مختلف ٹیسٹنگ بکس کا انتخاب کرتے تھے۔ کیونکہ اس وقت تک بچے 60 سے 70 فیصد سلیبس مکمل کر چکے ہوتے تھے۔لیکن آج حالات یکسر مختلف ہیں۔

کرونا کی عالمی وبا کی وجہ سے پاکستان میں نیا تعلیمی سیشن 15 ستمبر سے شروع ہوا ہے۔جس کا تقاضا یہ ہے کہ بچوں کو پہلے مرحلے میں ALP کے مطابق لرننگ کروائی جائے اور پھر اس کے بعد ٹیسٹنگ کا مرحلہ آئے گا۔آج مارکیٹ میں چند ناعاقبت اندیش کاروباری اداروں نے لرننگ کی بجائے ٹیسٹنگ بکس متعارف کروائی ہیں جن کا مقصد صرف اور صرف کاروبار ہے اور ایسی بکس بچوں کو recommend کرنا سراسر زیادتی ہے، کیونکہ آج ٹیسٹنگ کی بجائے لرننگ بکس کی ضرورت ہے۔

ادارہ کری ایٹو بکس، جس نے طلبا و طالبات کو ہمیشہ معیاری تعلیمی سہولیات مہیا کی ہیں، نے امسال بھی طلبا و طالبات کی تعلیمی ضروریات کو مدنظر رکھتے ہوئے، کری ایٹو سیلف ٹیسٹ پیپرز کی طرز پر ''**سمارٹ سلیبس لرننگ اینڈ ٹیسٹنگ**'' کے نام سے ایک منفرد سیریز متعارف کروائی ہے جس کے پہلے حصے میں طلبا و طالبات کو ALP کے عین مطابق حل شدہ معیاری لرننگ مواد مہیا کیا گیا ہے جب کہ دوسرے حصے میں ''سیلف ٹیسٹ پیپرز'' کے نام سے ٹیسٹنگ مواد ترتیب دیا ہے، تاکہ طلبا و طالبات لرننگ کے بعد اپنی امتحانی تیاری کی جانچ کر سکیں۔